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PATENT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Art Unit: 1206

Examiner: J. Reamer

P.D. File No.: 30-2004FWC

Inventors: RICHARD R. HERTZOG ET AL.

Serial No.: 920,811

Filed: July 24, 1992

For: DECOMPOSITION OF CUMENE HYDROPEROXIDE

Petersburg, Virginia 23806
March 1, 1993

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REQUEST FOR RECONSIDERATION

Commissioner of Patents & Trademarks
Washington, DC 20231

Dear Sir:

This is responsive to the Office Action of August 27, 1992. A request for a three month extension of time for response to March 1, 1993 and authorization to charge the fee accompany this letter.

Reconsideration of the rejection of claims 1, 2, 7 and 8 under 35 USC §103 as unpatentable over Sifniades in combination with Barcilli and Anderson is respectfully requested.

The reference to Barcilli is thought to mean U.K. patent 1,202,687 issued to Societas' Italiana Resine S.P.A.

Applicants have disclosed that to obtain high alpha-methyl styrene (AMS) yields under stable operating conditions with energy savings, enhanced safety of operation and reduced by-product formation a two stage operation is used. In the first stage, cumene hydroperoxide (CHP) is decomposed in a back-mixed reactor in the presence of acetone as that residual CHP concentration is between about 0.2 and about 3.0 weight percent. In the second stage the reaction is completed in a plug-flow reactor at 120° to 150°C. An optional plug-flow third stage, claimed in claim 2, may be used to reduce CHP concentration between these two stages. The reaction product

from the second stage plug-flow reaction is submitted to adiabatic flash evaporation to recover a water-containing acetone-rich distillate which is recycled to the first stage to provide acetone and at least a portion of the additional amounts of water.

U.K. Patent 1,202,687 is discussed and distinguished in the specification at page 3 line 12 through page 4 line 7. The broad conditions specified by the reference make it possible to obtain a reaction product that contains significant amounts of residual CHP which would not be appropriate for subsequent isolation of reaction products by conventional procedures such as distillation. We have found that when all CHP is decomposed in a single stage within the operating conditions specified by the reference, the clear intent of the reference, significant amounts of cumyl phenol and dimers are formed. Moreover, some DCP is formed which in the absence of a second stage designed to decompose DCP further decreases the yields of useful products.

The Examiner now cites U.K. 1,202,687 for its statement at page 2 lines 36-40 that "part of the acetone obtained after separation from the decomposition products, from which the acid catalyst has been removed, may be usefully recycled to the decomposition reactor."

This statement fails to teach or suggest the claimed step (c) which requires submitting the reaction product from step (b) to adiabatic flash evaporation to recover a water-containing acetone-rich distillate which is recycled to step(a) to provide acetone and at least a portion of additional amounts of water.

The acetone referred to in U.K. 1,202,687 would be that acetone obtained from distillation of the neutralized product sent through pipe 13 after neutralization of acid catalyst in anion exchange resin bed 12 in Figure 1. See the specification page 10 lines 4-10. Instead of recycling the acetone component recovered by distillation, applicants insert the adiabatic flash evaporation step (c) prior to neutralizing

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the acid catalyst. This step is not taught or suggested by the cited references.

Please see the specification at page 4 lines 19-23, pages 5 lines 8-11, page 6 lines 1-4 and 7-26, page 6 line 36 through page 7 line 12, page 9 line 25 through page 10 line 10 and the examples.

In the low residue (LR) technology of Sifniades et al., efficiency to phenol and AMS is enhanced by the reduced reaction of AMS with itself (dimer) and with phenol (cumyl phenol). Sifniades et al. uses a sealed system, ICI and others use a reflux condenser which returns vapor to the decomposer vessel. Both methods maintain concentrations of phenol, acetone and cumene in the vessel, but cannot provide the benefits available from the claimed invention:

1) Dilution in conjunction with LR technology (water addition to protect AMS as DCP until rapid reconversion in the dehydration step);

2) Flashed vapor both cooling the product and being condensed for recycle without energy penalty, and we have demonstrated to be of suitable composition (water azeotropes of cumene and phenol plus acetone) when recycled to the decomposer;

3) Flasher underflow is unchanged; whereas addition of materials (such as acetone) from any external source such as suggested by U.K. 1,202,687 would dilute the product stream and require increased equipment size and energy consumption for product recovery.

Accordingly, in view of the comments provided above it is respectfully requested that the rejection be reconsidered and withdrawn and the claims be passed to issue.

Respectfully submitted,
RICHARD R. HERTZOG ET AL.

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DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS
MAIL IN AN ENVELOPE ADDRESSED TO: COMMISSIONER OF PATENTS &
TRADEMARKS,

ON March 1, 1993

DATE
William H. Thrower

NAME OF APPLICANT, AGENT, OR APPLICANT'S ATTORNEY

William H. Thrower

SIGNATURE

March 1, 1993

DATE
WHT/rbk

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